PROC. ENTOMOL. SOC. WASH.
86(4), 1984, pp. 808–820

FIVE NEW SPECIES OF ORCHESELLINI FROM CENTRAL MEXICO (COLLEMBOLA: ENTOMOBRYIDAE: ORCHESELLINAE)

José A. Mari Mutt

Department of Biology, University of Puerto Rico, Mayaguez, Puerto Rico 00708.

Abstract.—Five new species of Orchesellini are described from specimens collected in five states of Central Mexico and in the Federal District: *Orchesella* ***quinaria***, *O.* ***bullulata***, *O.* ***impavid***, *Pseudodicranocentrus* ***niger***, and *Dicranorchesella* ***seminuda***. *Pseudodicranocentrus circulatus* is reported for the first time from the state of Morelos and a few details are added to its description. Forty-five figures complement the descriptions.

Through the courtesy of José G. Palacios Vargas, Universidad Nacional Autónoma de México, I have been able to study a number of Orchesellini collected by him and his colleagues in five states of Central Mexico and in the Federal District. The material includes six species, five of them new, distributed among three genera. Dr. Kenneth Christiansen, Grinnell College, Iowa, also lent me a specimen that was studied for the present contribution.

Three new species belong to *Orchesella,* a Holarctic taxon that meets its southern limits of distribution in the Nearctic areas of Mexico. The genus was first reported from this country by Palacios Vargas (1981a, b) but no species determinations were made.

The other three species belong in *Pseudodicranocentrus* and *Dicranorchesella,* genera endemic to Neotropical regions of Mexico. In only one instance, reported by Mari Mutt (1977) have species of *Orchesella* and *Dicranorchesella* been collected together. At Derrame del Chichinautzin, Morelos, *Orchesella bullulata* lives on the northern sections above 2150 m and two species of *Pseudodicranocentrus* occur on the southern slopes below 2100 m, but species of these two genera have not yet been found sympatrically.

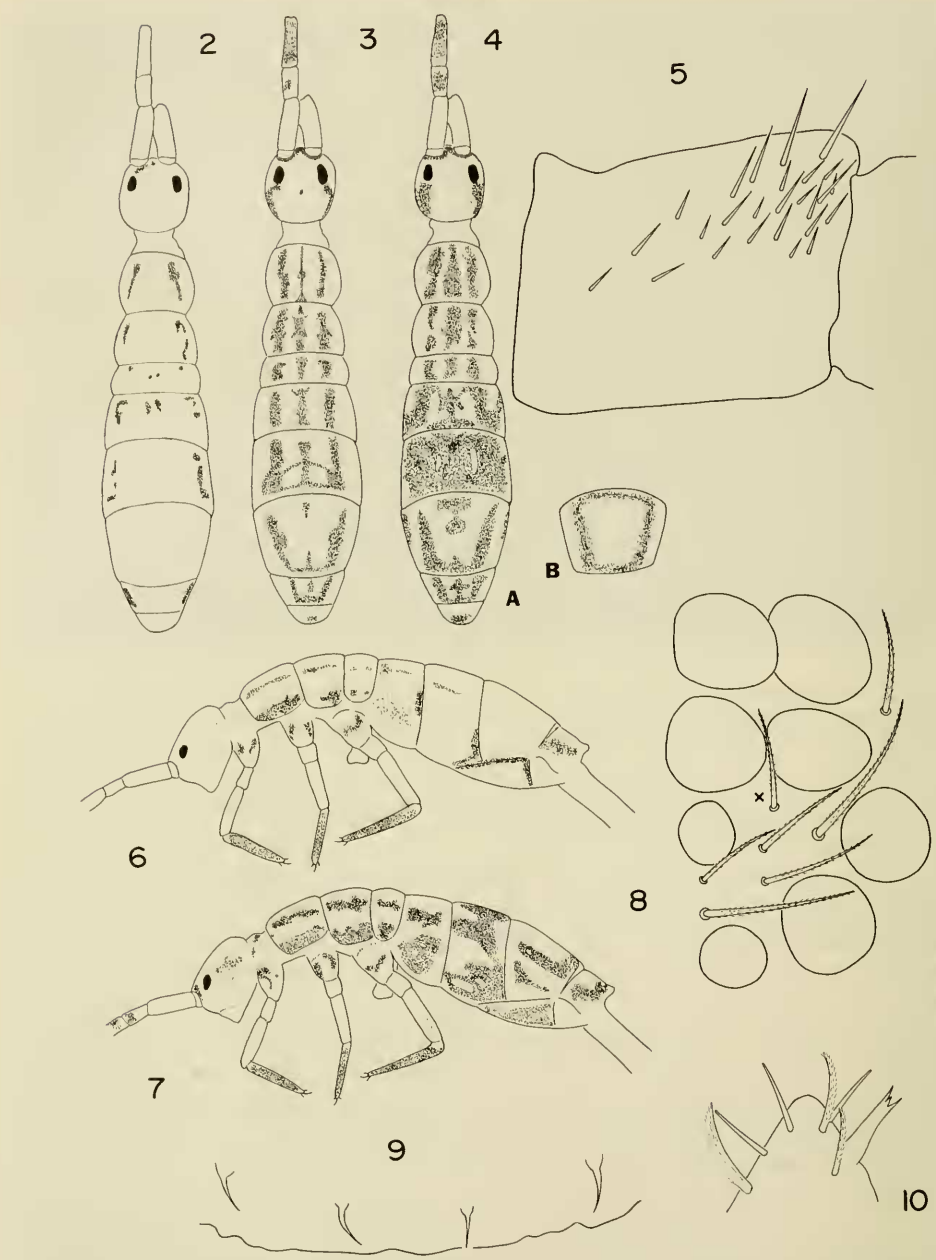
In the descriptions of the *Orchesella* species I have used the nomenclature system for the chaetotaxy of the third abdominal segment (Abd. 3) as proposed by Christiansen and Tucker (1977), and have adapted this system to the chaetotaxy of Abd. 2. Internal and posterior to the M group is found a macrochaeta which added to the median (M) group forms a median-posterior group (MP, Fig. 14).

All the holotypes and most of the paratypes are temporarily deposited in my collection, some paratypes of all the species are deposited in the collection of J. G. Palacios Vargas, Laboratorio de Acarología, Universidad Nacional Autónoma de México, México, D.F.

Fig. 1. *Dicranorchesella seminuda.* Scales on tergum of Abd. 2, the three sockets belong to the inner row of 3 macrochaetae present on this segment (Fig. 41).

Orchesella quinaria Mari Mutt, New Species
Figs. 2–17

Length to 4.0 mm. Body background light yellow. Typical color pattern—5 violet-black stripes (1 middorsal, 2 dorsolateral, 2 lateral) extending from the 2nd thoracic segment (Th. 2) to Abd. 4 (Figs. 3, 7). Very light individuals only with traces of these bands (Figs. 2, 6), darker specimens with much pigment between bands, rendering them less distinct (Fig. 4). Head with pigment around antennal bases and behind eyes, extending laterally to venter of head. A small spot of pigment occasionally on center of dorsum of head. Antennal segment 5 (Ant. 5) and Ant. 6 intensely pigmented, other segments with pigment decreasing in intensity towards head. Parts of coxae and tibiotarsi deeply pigmented. Collophore and furcula unpigmented. Apex of Ant. 6 (Fig. 10) with pin seta but without papillae or other projecting structures. Head macrochaetae An, A, M and S 5–7, 6–7, 4–5, and 9–10, respectively (Fig. 11), 3 macrochaetae along midline of head. Interocular chaetotaxy as in Fig. 8, an outer seta external to eyes A and D and 5 setae inside semicircular area defined by eyes C to H. Prelabral setae bifurcated (Figs. 12, 13). Labral papillae with pointed tips (Fig. 9). Differentiated seta of outer labial papilla short, placed far back on its papilla (Fig. 16). Posterior labial row internal to seta E with up to 16 setae per side ($\bar{x}$ = 9.8, n = 8), all ciliated. Labial setae E, L_1 and L_2 ciliated (L_2 smooth on left labial base of 1 specimen). Macrochaetal formula for Abd. 2: IA = 5–8, OA = 1–2, MP = 3, L = 2 (Fig. 14). Formula for Abd. 3: IA = 3–4, OA = 0–1, M = 2, L = 3 (Fig. 15). Corpus of



Figs. 2–10. *Orchesella quinaria.* 2, Distribution of violet-black pigment on light specimen. 3, Typical specimen. 4A, Dark specimen, 4B, Abd. 4 of specimen from Otongo (Hidalgo). 5, Trochanteral organ. 6, Cf. Fig. 2. 7, Cf. Fig. 3. 8, Eyes and interocular chaetotaxy, seta with x found only on right eyepatch of 1 specimen. 9, Labral papillae. 10, Apex of Ant. 6.

tenaculum with 1 seta. Trochanteral organ (Fig. 5) with up to 100+ slender smooth setae. Inner margin of unguis with basal pair of teeth and 1 unpaired tooth; unguiculus with small tooth on proximal third of one outer lamella (Fig. 17). Dorsum of manubrium with numerous ciliated setae and no smooth setae. Mucro with 2 teeth and basal spine.

Diagnosis.—The Nearctic species closest to *O. quinaria* are *O. zebra* Guthrie, apparently widespread in the eastern half of the United States, and *O. celsa* Christiansen and Tucker, recorded from numerous localities in the same general area. The new species may be distinguished from *O. zebra* by the position of the outer unguicular tooth, number of Abd. 2 MP setae, and number of Abd. 3 IA and M setae. Also, the median longitudinal line in *O. zebra* usually extends across Abd. 4 while even in dark specimens of *O. quinaria* the line is absent from the central portion of the segment.

Some individuals of *O. celsa* could be mistaken for darker specimens of *O. quinaria* but the former has the outer unguicular tooth near the middle of its lamella and possesses fewer Abd. 2 IA setae.

Two European species are similar in coloration to *O. quinaria*: *O. irregularilineata* Stach, known only from the Caucasus mountains, and *O. orientalis* Stach, reported only from the Ukrainskaya SSR. These species possess 4-toothed ungues and the outer unguicular tooth is placed beyond the middle of its lamella. Also, the largest specimens known of these species barely reach 3.0 mm while the largest specimen of *O. quinaria* is 4.0 mm long. The largest specimens of *O. zebra* and *O. celsa* also measure 3 mm or less.

Comments.—Most specimens of *O. quinaria* possess the pigmentation of Abd. 4 shown in Figs. 3 and 4A; a broad V-shaped pattern from the two dorsolateral stripes, and some pigment on the anterior median area representing the median line. Individuals from Otongo (Hidalgo) differ from the others in that Abd. 4 has a rectangular pattern with no trace of the median line (Fig. 4B).

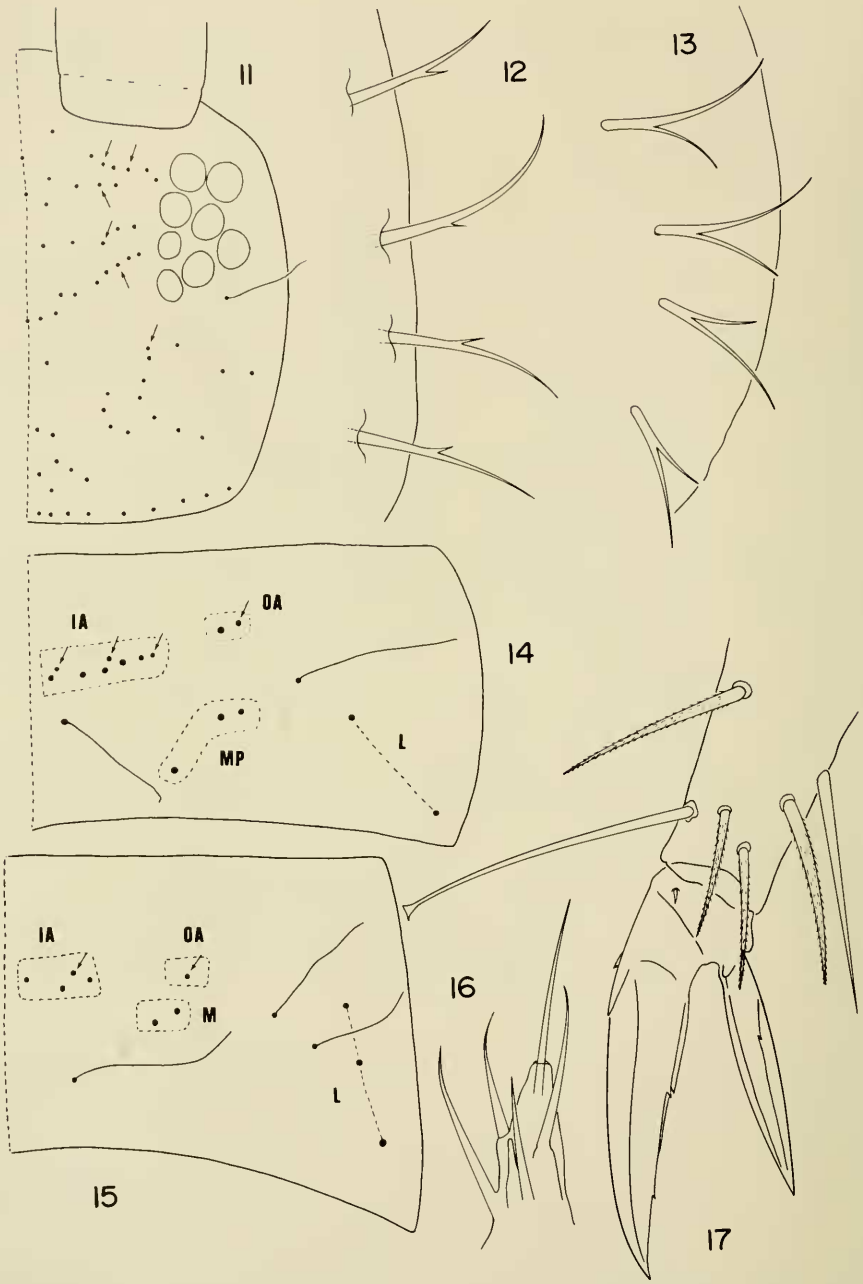
The number of setae on the trochanteral organ increases with the length of the specimen. Lengths (head + body) in mm for five specimens and the number of setae on their left and right trochanters are: 1.9 (27-27), 2.4 (37-40), 2.8 (63-54), 3.1 (75-80), 3.3 (100+-100+).

Material examined.—PUEBLA: Xecotepec de Juárez, 20.I.1980, leaf litter, J. Palacios, holotype and 18 paratypes (2 on slides). HIDALGO: Zacualtipan, road to Ferreria, 1860 m, 10–11.I.1981, bait traps placed on forest soil, A. H. Huacuja, 4 paratypes (2 on slides). As preceding but collected on 20.VI.1980, 1 paratype on slide. Hidalgo, 5 km Alumbres-Zacualtipan, 2160 m, leaf litter in mixed forest, G. Ibarra, 1 paratype on slide. Otongo, 1160 m, 3.IV.1961, necrotrap placed on secondary vegetation, M. A. Morón, 8 paratypes. Otongo, 1120 m, 3.V.–3.VI.1981, 2 paratypes (1 on slide).

Orchesella bullulata Mari Mutt, New Species

Figs. 18–24

Length to 3.9 mm. Body background light brown. Typical color pattern—wide dark-violet median band extending from Th. 2 to Abd. 3 or Abd. 4 and 2 wider broken lateral bands (Figs. 21, 23). Light specimens with more sharply defined bands (Figs. 20, 22). Head with pigment around antennal bases and behind eyes,



Figs. 11–17. *O. quinaria.* 11, Head macrochaetotaxy, setae with arrows absent from some specimens or present only on one side of the head. 12–13, Prelabral setae. 14–15, Macrochaetotaxy of Abd. 2 and Abd. 3, IA = inner anterior, OA = outer anterior, M = median, MP = median posterior, L = lateral; setae with arrows are absent from some specimens or present only on one side of the segment. 16, Outer labial papilla. 17, Metathoracic claws.

extending laterally to venter of head. Ant. 5 and Ant. 6 intensely pigmented, other segments not as intensely colored. Areas of coxae and all of tibiotarsi intensely pigmented, trochanters and femora lightly colored. Collophore with some pigment basally and distally, manubrium pigmented dorsally. Apex of Ant. 6 with a conspicuous protuberance (Fig. 24). Head macrochaetae An, A, M and S 6, 8, 5 and 13–14, respectively (Fig. 19), 3 macrochaetae along midline of head. Interocular chaetotaxy, labral papillae, differentiated seta of outer labial papilla, number of setae on tenaculum, and mucro as in *O. quinaria*. Prelabral setae not bifurcated. Posterior labial row internal to seta E with up to 15 setae per side ($\bar{x}$ = 9.1, n = 6), all setae ciliated. Labial setae E, L_1 and L_2 ciliated. Macrochaetal formula for Abd. 2: IA = 5–8, OA = 2, MP = 3, L = 2. Formula for Abd. 3: IA = 4–5, OA = 0–1, M = 2, L = 3. Trochanteral organ with up to 54 slender smooth setae. Inner margin of ungues with basal pair of teeth and 2 unpaired teeth, unguiculus with a small tooth on middle of one outer lamella (Fig. 18).

Diagnosis.—The three longitudinal bands on the body should distinguish this species from other Nearctic forms except perhaps some individuals of *O. celsa* Christiansen and Tucker, a widespread species in the eastern half of the United States. Both species differ in the number of inner ungual teeth, number of Abd. 2 and Abd. 3 IA setae, and in the presence of the apical protuberance on Ant. 6 of *O. bullulata*. In addition, the largest individuals of *O. celsa* reach 2.7 mm while the largest specimens of *O. bullulata* are 3.9 mm long.

Orchesella balcanica Stach, known from Bulgaria and Romania, has a somewhat similar color pattern but the median longitudinal line is thinner, Abd. 4 is more intensely pigmented, Ant. 6 apparently lacks the apical protuberance, and the largest individuals reach 4.5 mm.

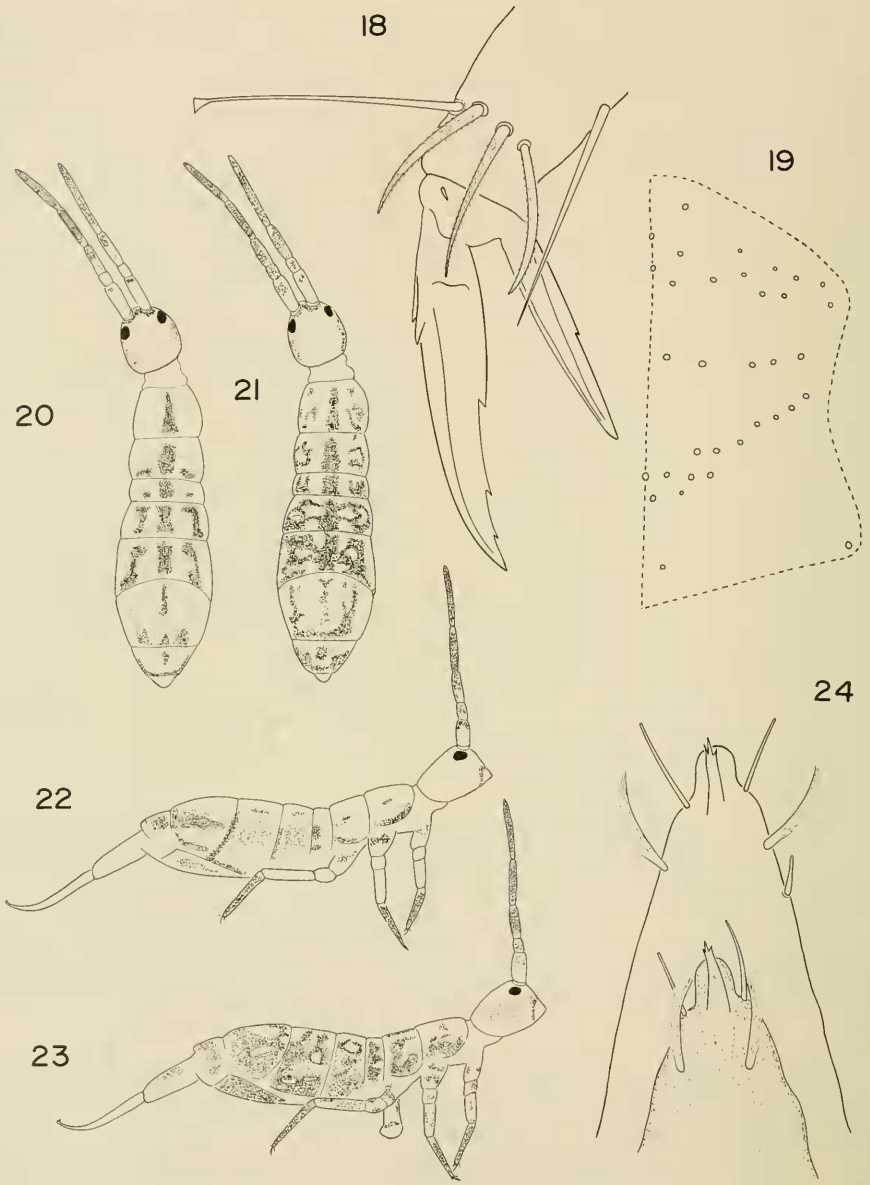
Comments.—There is some variation in the size of the protuberance on Ant. 6. Usually, the dilation is well developed but in a few specimens it is small. One specimen has it reduced on the left antenna and its right antenna lacks this structure. Absence of a cuticular depression suggests that this protuberance is not an eversible papilla. It is not an artifact caused by preservation or mounting procedure because it is present in specimens from various localities, collected on different dates, and also on the antennae of individuals preparing to molt (Fig. 24).

Material examined.—(collected by J. Palacios except as noted). MORELOS: southern slopes of Derrame del Chichinautzin, 22.I.1978, leaf litter, holotype and 20 paratypes (3 on slides). Derrame del Chichinautzin, 2260 m, 5.XII.1976, leaf litter, 2 paratypes (2 on slides). As preceding but 2450 m, *Quercus* leaf litter, 2 paratypes (1 on slide). As for preceding but 2150 m, 25.IV.1976, 1 paratype. MICHOACAN: El Tren, km 38 Rd. Hidalgo-Charo, pine leaf litter, 1 paratype on slide. DISTRITO FEDERAL: Contreras, Primer Dínamo, 9.X.1975, leaf litter, 1 paratype on slide. Barrio Capoltitla, 3000 m, 28.XI.1976, leaf litter, 1 paratype on slide. Road Xochimilco-Oaxtepec, Km 52, 15.I.1982, G. Morales, 7 paratypes (2 on slides). MEXICO: Valle de Bravo, 20.X.1979, pine litter, C. Cramer, 3 paratypes (1 on slide).

Orchesella impavida Mari Mutt, New Species

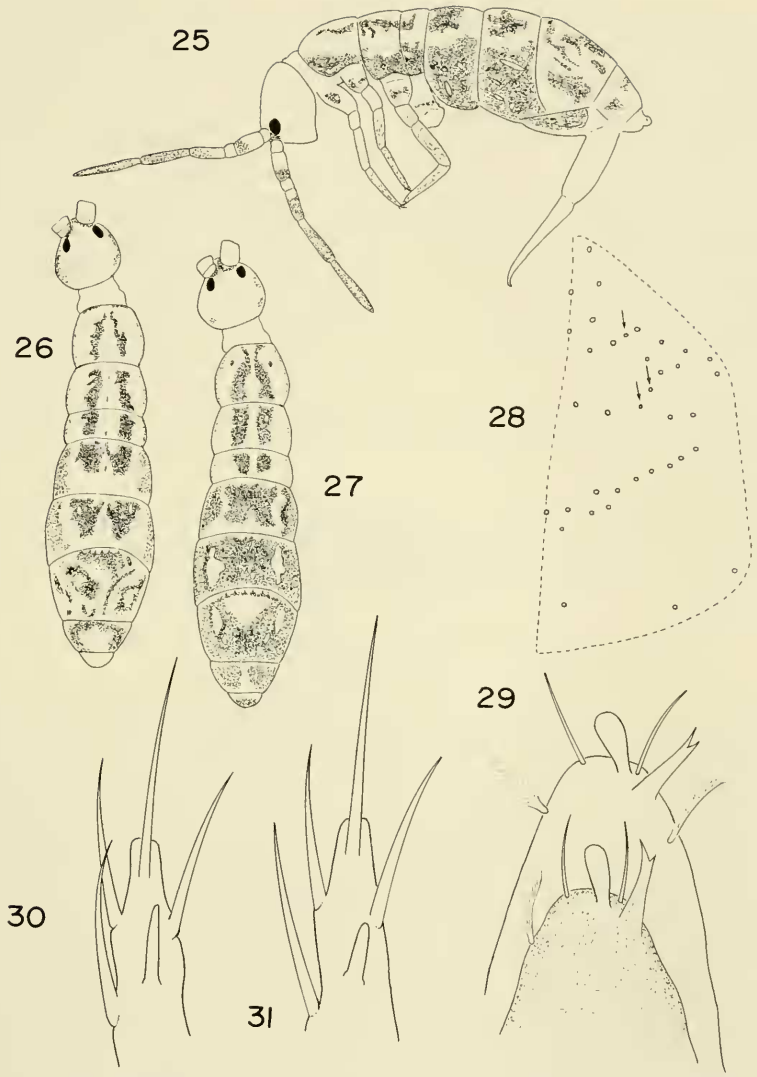
Figs. 25–29

Length to 3.0 mm. Body background light yellow. Typical color pattern—4 violet-black bands extending from Th. 2 to Abd. 3. Paramedial bands clearly



Figs. 18–24. *Orchesella bullulata.* 18, Metathoracic claws. 19, Head macrochaetotaxy. 20, Distribution of dark violet pigment on light specimen. 21, Typical specimen, 22, Cf. Fig. 20. 23, Cf. Fig. 21. 24, Apex of Ant. 6, molting specimen.

separated from each other at least through Abd. 1, most specimens have these bands separated through Abd. 3 (Fig. 26) but in darker specimens the median bands of Abd. 2 and Abd. 3 are fused (Fig. 27). Lateral bands wide, running complete length of specimens (Fig. 25). Head with pigment around antennal bases and behind eyes, extending laterally to venter of head. Ant. 5 and Ant. 6 intensely pigmented, other segments less intensely colored and with pigment restricted



Figs. 25–29. *Orchesella impavida.* 25–26, Distribution of violet-black pigment on typical specimen. 27, Dark specimen. 28, Head macrochaetotaxy, setae with arrows are absent from some specimens or present only on one side of the head. 29, Apex of Ant. 6. Figs. 30–31. *Pseudodicranocentrus circulatus,* outer labial papilla, note presence of one seta near base of differentiated seta and compare the length of the differentiated seta in both figures.

mostly to apical areas. Part of coxae intensely pigmented, other leg segments uniformly but lightly colored. Collophore with some pigment distally. Dark specimens with pigment on dorsum of manubrium. Apex of Ant. 6 with a simple papilla (Fig. 29). Head macrochaetae An, A, M and S 7, 8–9, 4–6, and 12, respectively (Fig. 28), 3 macrochaetae along midline of head. Interocular chaetotaxy seen in 2 specimens, one with 4 inner setae, other with 5 setae. One specimen with a median prelabral seta bifurcated, other prelabral setae of this specimen and of all other specimens not bifurcated. Differentiated seta of outer labial papilla,

number of setae on tenaculum, setae on manubrium, and mucro as in *O. quinaria.* Claw structure as in *O. bullulata.* Posterior labial row internal to seta E with up to 6 setae per side ($\bar{x} = 4.7$, n = 6), all setae ciliated. Labial setae E, L_1 and L_2 ciliated. Macrochaetal formula for Abd. 2: IA = 8–11, OA = 2–3, MP = 3, L = 1. Formula for Abd. 3: IA = 3, OA = 0–1, M = 2, L = 3. Trochanteral organ with up to 36 slender smooth setae. Male genital plate circinate, with 16 smooth setae in 1 row around periphery of plate, 2 pairs of well developed smooth setae on median portion of plate and 1 pair of very small smooth setae near genital opening.

Diagnosis.—Color pattern is similar to that of *O. ainsliei* Folsom, a widespread species in the eastern half of the United States, and to that of *O. longifasciata* Stach, known from the eastern Alps. From the first, *O. impavida* may be distinguished by the presence of an apical papilla on Ant. 6, only 1 tenacular seta, number of Abd. 2 IA setae, and maximum length of the specimens (2.0 mm in *O. ainsliei,* 3.0 mm in *O. impavida*). Individuals of *O. longifasciata* have less conspicuous lateral pigment bands and the unguicular tooth is inserted before the middle of its lamella.

Material examined.—MEXICO: Volcán Popocatepetl, *Cuppressus* forest, 3000 m, 5.IV.1982, in mosses growing on trees, J. Palacios, holotype and 8 paratypes (2 on slides).

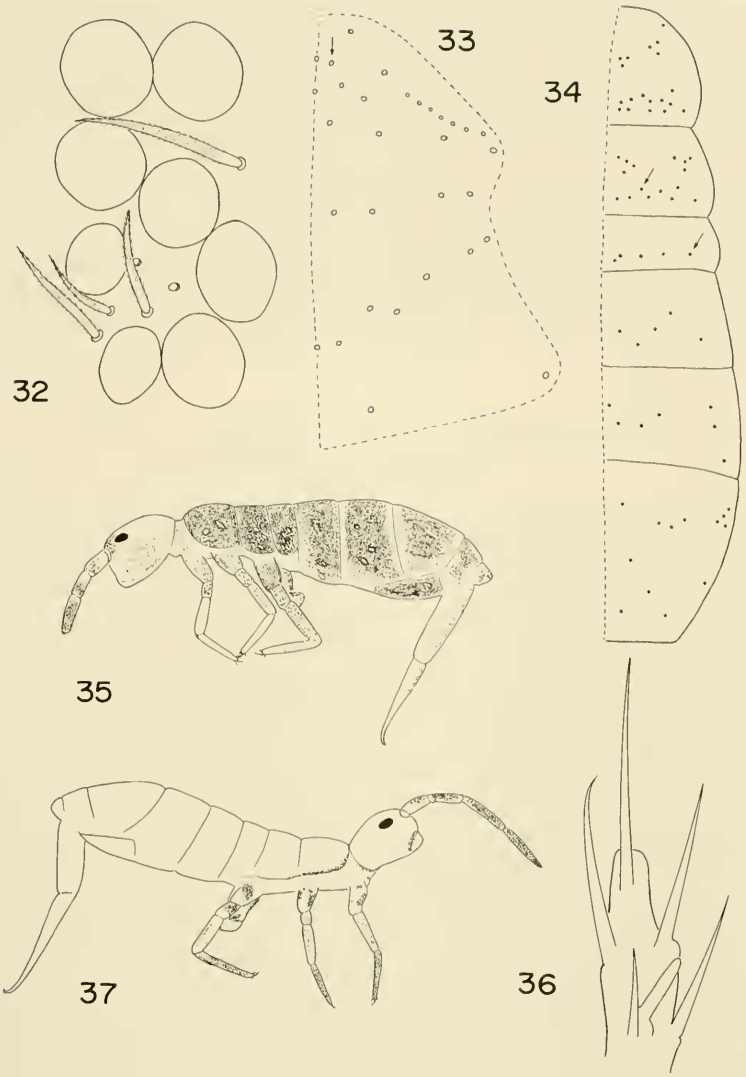
Pseudodicranocentrus niger Mari Mutt, New Species

Figs. 32–36

Length to 2.6 mm. Distribution of violet-black pigment as in Fig. 35; parts of antennae, dorsum of head, some leg segments, and dentes light yellow, otherwise animal is almost uniformly black. Apex of Ant. 6 with pin seta and no papilla. Eyes 8 + 8, G and H smaller but well developed. Interocular chaetotaxy as in Fig. 32. Head macrochaetae An, A, M and S 10, 7–8, 4 and 7, respectively (Fig. 33), 3 macrochaetae along midline of head. Some prelabral setae bifurcated. Labral papillae as in *Orchesella quinaria.* Differentiated seta of outer labial papilla short, placed far back on its papilla, with 2 setae flanking its base (Fig. 37). Posterior labial row to seta E with up to 9 setae, all ciliated; setae E, L_1 and L_2 ciliated. Body macrochaetotaxy as in Fig. 34. Trochanteral organ with up to 51 slender smooth setae. Inner margin of tibiotarsi without smooth setae. Tenent hair clavate. Inner margin of ungues with basal pair of teeth and 2 unpaired teeth, unguiculus with a small outer tooth. Dorsum of manubrium with many ciliated setae and no smooth setae or scales, dentes without smooth setae. Dental lobe without compound spines, no spines along inner or outer margins of dentes. Mucro with 2 teeth and basal spine.

Diagnosis.—This species is close to *P. circulatus* (Mari Mutt) which may occur sympatrically with *P. niger* and has been reported from the states of Oaxaca, Puebla and Guerrero, and from Guatemala. Both species can be distinguished by the color pattern (Figs. 35, 36), absence of compound spines on the dental lobe of *P. niger,* details of the macrochaetotaxy of Th. 3 and Abd. 1 (Fig. 34), and by the presence in *P. niger* of two setae flanking the differentiated seta of the outer labial papilla (Fig. 37, cf. Figs. 30, 31).

Material examined.—MORELOS: southern slope of Derrame del Chichinautzin, 2100 m, 4.VII.1976, leaf litter in *Bursera cuneata* forest, J. Palacios, coll. no. Z(54), holotype and 1 paratype (both on slides).

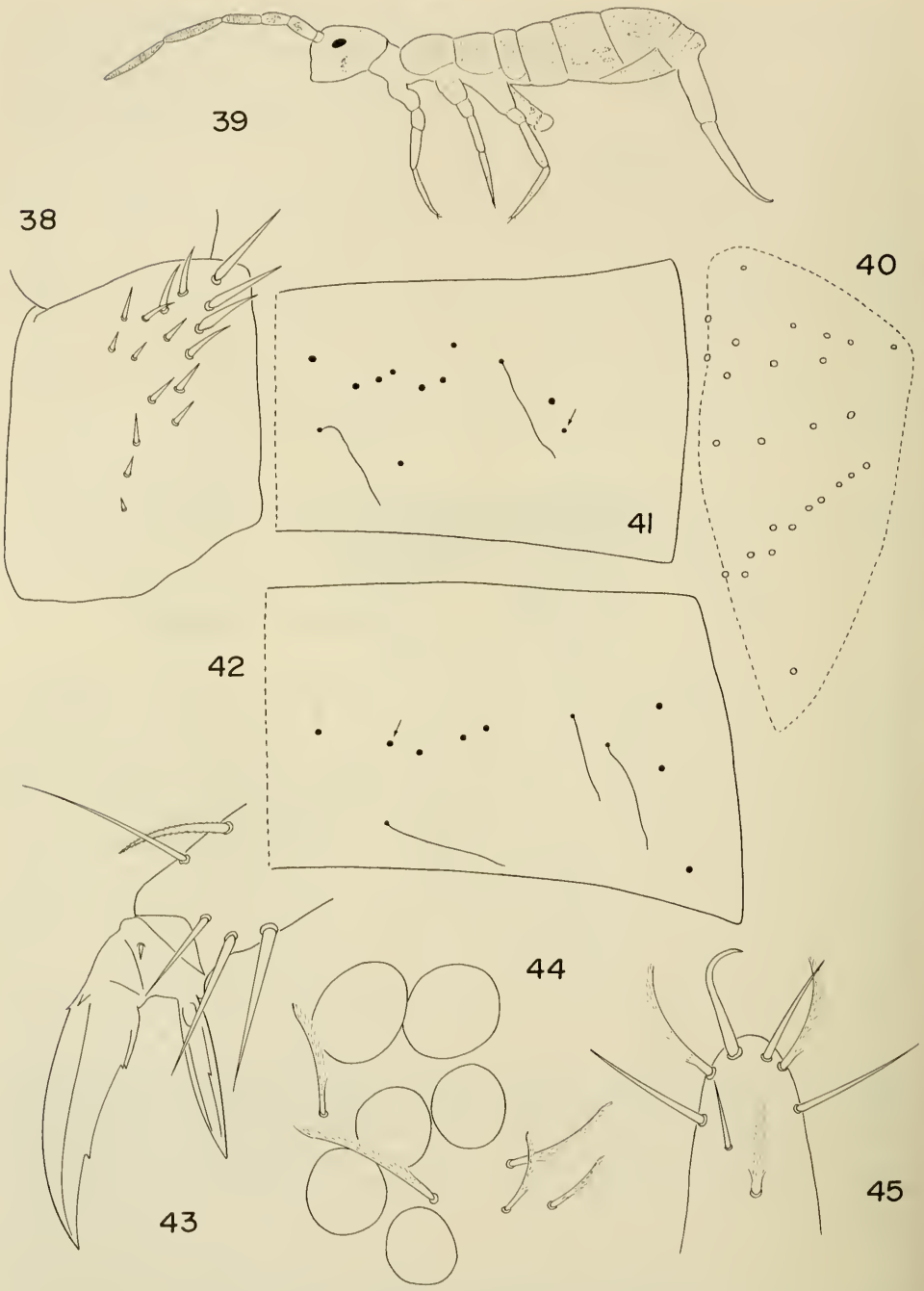


Figs. 32–36. *Pseudodicranocentrus niger.* 32, Eyes and interocular chaetotaxy. 33, Head macrochaetotaxy, this pattern is identical to that of *P. circulatus* except that seta with arrow is absent in the holotype of that species but is present in individuals from Morelos. 34, Body macrochaetotaxy, setae with arrows are absent in *P. circulatus.* 35, Distribution of violet-black pigment. 36, Outer labial papilla, note presence of two setae near base of differentiated seta. 37, *P. circulatus,* distribution of violet pigment.

Pseudodicranocentrus circulatus (Mari Mutt)

Figs. 30–31, 37

This species was described in 1979 and additional notes were added by me in 1981. Individuals sympatric with *P. niger* can be readily distinguished by the characteristic light coloration of this species (Fig. 37). Fig. 33 presents the anterior head macrochaetotaxy of *P. niger,* which is identical to that of *P. circulatus.* This



Figs. 38–44. *Dicranorchesella seminuda*. 38, Trochanteral organ. 39, Distribution of light blue pigment. 40, Head macrochaetotaxy. 41, Macrochaetotaxy of Abd. 2, seta with arrow only on the right side of one specimen. 43, Metathoracic claws. 44, Eyes and interocular chaetotaxy. 45, Apex of Ant. 6.

figure, which I have checked with the holotype, corrects the number of setae in the A and M groups given in my 1979 paper (p. 42).

A minute detail heretofore unnoticed represents a useful character worthy of investigation in other groups. The outer labial papilla of *P. circulatus* lacks a small seta near the base of the differentiated seta (Figs. 30, 31) which is present on both specimens of *P. niger* (Fig. 37).

Material examined.—MORELOS: southern slope of Derrame del Chichinautzin, 2100 m, 4.VII.1976, leaf litter in *Bursera cuneata* forest, J. Palacios, coll. no. Z(54), 3 specimens on slides. OAXACA: forest trail 25–30 km E of Huautla de Jiménez, on way to Cerro Rabón, 23.III.1981, A. Grubbs, 1 specimen on slide. GUERRERO: Zacatecolotla, outside of Aguacachil cavern, 29.XI.1980, J. Palacios, 1 specimen on slide.

Dicranorchesella seminuda Mari Mutt, NEW SPECIES

Figs. 1, 38–44

Length to 2.5 mm. Head, body and appendages uniformly light blue (Fig. 39), antennae darker, dentes unpigmented. Dorsum of body segments with ciliated microchaetae and few slender scales (Fig. 1), scales longer and more abundant on venter of furcula. Head, legs, collophore, dorsum of manubrium, and dentes unscaled. Venter of head with ciliated setae and smooth setae. Ant. 5 and Ant. 6 distinctly annulated; Ant. 3 well developed, about 0.75× length of Ant. 4. Apex of Ant. 6 with a long apically curved smooth seta and without pin seta or papillae (Fig. 45). Eyes apparently 6 + 6, G and H not visible in cleared specimens. Interocular chaetotaxy as in Fig. 44, 1 outer seta, 1 inner seta and 3 setae external to eyes C and F. Head macrochaetae An, A, M and S 5, 6, 4 and 11, respectively (Fig. 40), 3 macrochaetae along midline of head. Prelabral setae not bifurcated. Labral papillae and differentiated seta of outer labial papilla as in *Orchesella quinaria*. Posterior labial row internal to seta E with up to 7 setae, 2 always smooth and longer than the ciliated setae. Labial seta E smooth or ciliated, setae 1_1 and 1_2 smooth. Macrochaetotaxy of Abd. 2 and Abd. 3 as in Figs. 41, 42. Trochanteral organ with up to 20 thick spinelike setae (Fig. 38). Inner margin of tibiotarsi with irregular rows of erect smooth setae; 1–4 of these setae may be present on distal outer margin of segment. Tenent hair lanceolate. Inner margin of ungues with 3 teeth, outer margin of unguiculus with a small tooth placed near the middle of its lamella (Fig. 43). Dorsum of manubrium with many ciliated setae and 12–46 smooth erect setae, 1–4 similar smooth setae on dorsal proximal portion of each dens. Dentes with 7–9 spines which towards the mucro gradually transform into curved ciliated setae. Dental lobe with 2–3 short spines. Mucro with 2 teeth and basal spine.

Diagnosis.—This species is closest to *D. boneti* Mari Mutt, reported from the states of Hidalgo, Veracruz and San Luis Potosi. Both may be distinguished by scale morphology (compare Fig. 1 with Mari Mutt, 1978: 133, Fig. 11) and by the absence of scales from the head of *O. seminuda*.

Material examined.—PUEBLA: Xecotepec de Juárez, 20.I.1980, leaf litter, J. Palacios, holotype and 4 paratypes (2 on slides). As preceding but collected 7.IX.1980, 1 paratype on slide.

Literature Cited

Christiansen, K. A. and B. E. Tucker. 1977. Five new species of *Orchesella* (Collembola: Entomobryidae). Proc. Iowa Acad. Sci. 84: 1–13.

Mari Mutt, J. A. 1977. *Dicranorchesella,* a new genus of springtails from Mexico (Collembola: Entomobryidae). Proc. Entomol. Soc. Wash. 79(3): 377–382.

———. 1978. A new species of springtails from Mexico, *Dicranorchesella occulta* n. sp. and a redescription of *D. boneti* (Collembola: Entomobryidae). Rev. Biol. Trop. 26(1): 125–137.

———. 1979. A revision of the genus *Dicranocentrus* Schött (Insecta: Collembola: Entomobryidae). Univ. P. R. Agric. Exp. Stn. Bull. 259, 79 p.

———. 1981. New genus, new species, and complements to the descriptions of seven neotropical *Dicranocentrus* (Collembola: Entomobryidae: Orchesellinae). J. Agric. Univ. P. R. 65(2): 90–107.

Palacios-Vargas, J. G. 1981a. Note on Collembola of Pedregal de San Angel, Mexico, D.F. Entomol. News 92(1):42–44.

———. 1981b. Collembola asociados a *Tillandsia* (Bromeliaceae) en el derrame lávico del Chichinautzin, Morelos, Mexico. Southwest. Entomol. 6(2): 87–98.